Rule WLM122: Significant transaction time was in Idle state

Finding: A significant amount of the transaction response time for the service class missing its performance goal was spent in the Idle state. This finding applies to service classes that are part of a subsystem (e.g., CICS transactions).

Impact: This finding has NO IMPACT, LOW IMPACT, MEDIUM IMPACT or HIGH IMPACT on performance of the service class. The finding primarily indicates that either (1) the workload classification scheme improperly groups conversational transactions in the same service class as non-conversational transactions or (2) the performance goal has been improperly specified for the service class.

Logic flow: The following rules cause this rule to be invoked:

Rule WLM104: Subsystem Service Class did not achieve average response goal

Rule WLM105: Subsystem Service Class did not achieve percentile response goal

Discussion: When CPExpert produces Rule WLM104 or Rule WLM105 to indicate that a subsystem service class did not achieve its performance goal, the logic of these rules tries to identify the cause of the delay. The cause of the delay initially is analyzed from the "served" service class view. The delays from the served service class are reported by CICS/ESA Version 4.1 or IMS Version 5 (or later versions) interaction with the Workload Manager, using the Workload Management Services macros[1].

CICS reports two separate views of the transactions: the *begin_to_end phase* and the *execution phase*[2].

- **Begin_to_end phase**. The begin_to_end phase starts when CICS has classified the transaction[3]. This action normally is done in a CICS Terminal Owning Region (TOR).

[1]Please refer to Section 4 of this document for more detail about the Workload Management Services macros and how the subsystems use these macros to exchange information with the Workload Manager.

[2]IMS Version 5 reports only *execution phase* samples.

[3]Classifying the transaction into a service class is done by the Workload Manager when the subsystem manager issues the IWMCLSFY macro. Please refer to Section 4 for a more complete discussion of the subsystem work manager (e.g., CICS) interaction with the Workload Manager.

- **Execution phase**. The execution phase starts when either CICS or IMS (Version 5 or later) has started an application task to process the transaction. For CICS, this normally is done in a CICS Application Owning Region (AOR). For IMS, this is done in an IMS Message Processing Region (MPR).

Within each phase, CICS or IMS reports the "state" of the transaction, from the view of CICS or IMS. The state of the transaction is reported in the following categories[4]:

- **Idle state**. (Both CICS and IMS report this state.

- **Ready state**. Only CICS reports this state.

- **Active state**. Both CICS and IMS report this state.

- **Wait state**. Both CICS and IMS report this state, but IMS provides only Wait for I/O state and Wait for Lock state.

- **Switched state**. Only CICS reports this state.

If the subsystem supports work manager delay reporting, the delay information is available in the "Work Manager/Resource Manger State Section" of SMF Type 72 (Subtype 3) records. When a transaction service class fails to achieve its performance goal, CPExpert analyzes the information to identify the primary and secondary causes of delay.

CPExpert produces Rule WLM122 when the primary or secondary cause of delay was that the transaction service class was in the Idle state for a significant percent of its response time. The Idle state indicates that no work request was available to the work manager (CICS or IMS) that is allowed to run.

For CICS transactions, this is the time accounted for by tasks executing in the CICS region. These tasks would be shown as "Suspended" by the CEMT INQUIRE TASK command.

For IMS transactions, this is the time that the Message Processing Region was not handling a transaction.

For CICS transactions, this time differs depending upon the types of tasks executing.

[4]Please refer to Section 4 of this document for a more comprehensive discussion of the transaction states and the interaction between the subsystem (CICS or IMS) and the Workload Manager.

- Tasks could be waiting of a principal facility (for example, conversational tasks that were waiting for a resource from a terminal user).
- The Terminal Control (TC) task (CSTP) could be waiting for work.
- The interregion controller task (CSNC) could be waiting for transaction routing requests.
- CICS system tasks (such as CSSY) could be waiting for work.

None of these tasks should be in a service class with a response goal, as neither CICS nor the Workload Manager can provide resources to reduce the response time.

The following example illustrates the output from Rule WLM122:

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RULE WLM122:  SIGNIFICANT TRANSACTION TIME WAS IN IDLE STATE

  A significant amount of the transaction response time for CICUSRA Service
  Class was spent in the Idle State.  For CICS transactions, this time
  differs depending upon the types of tasks executing.
    - Tasks could be waiting of a principal facility (for example,
      conversational tasks that were waiting for a resource from a
      terminal user).
    - The Terminal Control (TC) task (CSTP) could be waiting for work.
    - The interregion controller task (CSNC) could be waiting for
      transaction routing requests.
    - CICS system tasks (such as CSSY) could be waiting for work.
  These tasks would be shown as "Suspended" by the CEMT INQUIRE TASK
  command.  CPExpert suggests that these transactions be identified and
  placed into their own service class.  Idle time normally should not
  included in a service class with response performance objectives.
```

Suggestion: CPExpert suggests that you consider the following alternatives:

- **Modify your workload classification scheme**. The most likely problem is that the workload classification scheme does not adequately partition the transactions into time-critical service classes and service classes that do not have a critical response goal.

  CPExpert suggests that you modify the workload classification scheme such that the transactions experiencing Idle state time are placed into a service class different from the service class containing important transactions. While it may be true that the transactions experiencing Idle state time are "important" transactions, the Workload Manager cannot

allocate resources to reduce response for transactions that are in Idle state for reasons outside the Workload Manager's control.

- **Review the performance goal for the service class**. From a "conceptual" view, the transactions experiencing Idle state "should" be assigned an execution velocity goal; they would receive CPU time when they wanted the CPU time. However, the Workload Manager cannot assign resources to transactions, but assigns the resources to address spaces supporting the transactions. Thus, the Workload Manager ISPF application does not allow transaction subsystem service classes to be defined with any goal other than a response goal.

  If you specify a short response goal, the Workload Manager will incur overhead attempting to meet a performance goal for events outside its control. While the Workload Manager often will detect this situation (that is, it will detect that it cannot take action to improve response for the service class), there is no point in having the Workload Manager incur the overhead required to make the decision.

  CPExpert suggests that you specify a **very long** response goal[5] for the service class containing the transactions in Idle state. These transactions are idle (Suspended) waiting for events outside the Workload Manager's control.

  This action should be done only after important transactions with valid response goals have been removed from the service class! You should modify your workload classification scheme, if necessary, to make sure that the important transactions have been removed from the service class with the long response goal.

- **Run transactions in the service class in a CICS region that is exempt from response time management**. With OS/390 V2R10, IBM introduced an “exemption from transaction response time management” option. This option is available with APAR OW43812 installed. With the APAR applied, organizations can specify whether an address space (CICS region or IMS region) will be managed based on the goals of the transactions that the region is serving, or managed based on the goals specified for the region itself. This option is exercised by using the new “Manage Region Using Goals Of:” field on the WLM ISPF “Modify Rules for the Subsystem Type” panel.

  - When “TRANSACTION” is entered in the “Manage Region Using Goals OF:” field, the region will be managed as a CICS/IMS transaction server by the WLM. “TRANSACTION” is the default

[5]CPExpert identifies transaction subsystem service classes and will suppress Rule WLM006 for these service classes.

specification. If “REGION” is entered in this field, the region will be managed based on the performance goal specified for the service class to which the region is assigned. This performance goal normally would be an execution velocity goal.

- When “REGION” is specified, the WLM does not consider the region to be a “server” of transactions[6]. Rather, the WLM server topology algorithms ignore the region when establishing server topology. Consequently, the goals for any transaction processed by the region will not be considered by the WLM when it determines whether service class periods meet goals and whether policy adjustment is necessary.

If possible (from a systems design or political view), you should consider assigning the transactions experiencing high Idle times to a CICS region that is managed according to the goals of the region. You can assign an appropriate execution velocity goal to this region, consistent with the goals of the transactions being processed by the region.

[6] Please refer to Chapter 2 (Subsystem Transactions) for a discussion of the servers and served concept.